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Curriculum Units by Fellows of the National Initiative
2020 Volume IV: Solving Environmental Problems through Engineering

The Engineering of Green Infrastructure and Stormwater Management Practices

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This unit, designed for Advanced Placement Environmental Science, helps students connect the issue of stormwater runoff and urban flooding to land use and impervious surfaces. Students study the use of gray infrastructure such as curbs, gutters, and sewers and their environmental consequences, including flooding, erosion of stream banks, and transfer of pollutants to surface water bodies. Green infrastructure is then introduced as a potential solution to these environmental problems. Students learn about management practices such as constructed wetlands, swales and bioretention basins, green roofs, rain gardens, and permeable pavements. Simple hydraulic runoff models are introduced as a tool for studying runoff and design effective management practices. Students also learn about flooding in two communities within our school district that experience routine flooding. Ultimately they are tasked with using their understanding of green infrastructure and stormwater runoff models to develop an environmentally-friendly and effective stormwater management plan for dealing with the flooding in these two communities. This unit addresses several science practices outlined by College Board, including explaining environmental concepts, processes, and models presented in written and visual format and proposing and justifying solutions to environmental problems. Students use these practices to satisfy AP Environmental Science Learning Objectives EIN-2.M (describe the relationship between land use and flood risk) and STB-3.E (explain how the use of green infrastructure can reduce the risk of flooding during heavy rainfall events).

(Developed for AP Environmental Science, grades 11-12; recommended for Environmental Issues, grades 10-11)

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